



SEQUENCE LISTING

<110> Mitsuhashi, Kazuya
Yamamoto, Hiroaki
Kimoto, Norihiro

<120> MUTANTS OF MYCOBACTERIUM VACCAE-DERIVED
FORMATE DEHYDROGENASE AND USES THEREOF

<130> 14879-093001

<140> US 09/996,008

<141> 2001-11-28

<150> JP 2000-363894

<151> 2000-11-29

<150> JP 2001-254631

<151> 2001-08-24

<160> 27

<170> FastSEQ for Windows Version 4.0

<210> 1

<211> 1206

<212> DNA

<213> Mycobacterium vaccae

<400> 1

atggcaaaag	ttctgtgtgt	tctttacgat	gatccgggtcg	acggctaccc	gaagacctat	60
gcccgcgacg	atcttccgaa	gatcgaccac	tatccggggcg	gccagatctt	gccgacgccg	120
aaggccatcg	acttcacgcc	cgggcagttg	ctcgggtccg	tctccggcga	gctcggcctg	180
cgaccatata	tcgagtccaa	cggccacacc	ctgggtcgtga	cctccgacaa	ggacggcccc	240
gactcgggtg	tcgagcgcga	gctgggtcgat	gcggatgtcg	tcattctcca	gcccttctgg	300
ccggcctatc	tgacgcccga	gcgcatcgcc	aaggccaaga	acctgaagct	cgcgctcacc	360
gccggcatcg	gttccgacca	cgtcgatctt	cagtcgggcta	tcgaccgcaa	cgtcaccgtg	420
gcggaagtca	cctactgcaa	ctcgatcagc	gtcgcgcgagc	atgtggtgat	gatgatcctg	480
tcgctggtgc	gcaactatct	gccctcgcac	gaatggggcgc	ggaagggcgg	ctggaacatc	540
gccgactgcg	tctcccacgc	ctacgacctc	gagggcgatgc	atgtcggcac	cgtggccgcc	600
ggccgcacat	gtctcgcggt	gctgcgccgt	ctggcgccgt	tcgacgtgca	cctgcactac	660
accgaccgtc	accgcctgcc	ggaatcggtc	gagaaggagc	tcaacctcac	ctggcacgcg	720
accgcgcagg	acatgtatcc	ggtttgcgac	gtggtgacgc	tgaactgccc	gctgcacccc	780
gaaaccgagc	acatgatcaa	tgacgagacg	ctgaagctgt	tcaagcgtgg	cgcctacatc	840
gtcaacaccg	cccgcggcaa	gctgtgcgac	cgcgatgccg	tggcacgtgc	gctcgaatcc	900
ggccgggtcg	ccggctatgc	cggcgacgtg	tggttcccgc	agccggcgcc	gaaggaccac	960
ccctggcgga	cgatgcccta	taacggcatg	accccgca	tctccggcac	cacgctgacc	1020
gcgcaggcgc	gttatgcggc	gggcacccgc	gagatcctgg	agtgtctctt	cgagggccgt	1080
ccgatccgcg	acgaatacct	catcgtgcag	ggcggcgctc	ttgccggcac	cggcgcgcgt	1140
tctactcgga	agggcaatgc	caccggcggt	tcggaagagg	ccgccaatt	caaaaaagcg	1200
gtctaa						1206

<210> 2

<211> 401

<212> PRT

<213> Mycobacterium vaccae

<400> 2

```

Met Ala Lys Val Leu Cys Val Leu Tyr Asp Asp Pro Val Asp Gly Tyr
 1          5          10          15
Pro Lys Thr Tyr Ala Arg Asp Asp Leu Pro Lys Ile Asp His Tyr Pro
      20          25          30
Gly Gly Gln Ile Leu Pro Thr Pro Lys Ala Ile Asp Phe Thr Pro Gly
      35          40          45
Gln Leu Leu Gly Ser Val Ser Gly Glu Leu Gly Leu Arg Pro Tyr Leu
      50          55          60
Glu Ser Asn Gly His Thr Leu Val Val Thr Ser Asp Lys Asp Gly Pro
65          70          75          80
Asp Ser Val Phe Glu Arg Glu Leu Val Asp Ala Asp Val Val Ile Ser
      85          90          95
Gln Pro Phe Trp Pro Ala Tyr Leu Thr Pro Glu Arg Ile Ala Lys Ala
      100          105          110
Lys Asn Leu Lys Leu Ala Leu Thr Ala Gly Ile Gly Ser Asp His Val
      115          120          125
Asp Leu Gln Ser Ala Ile Asp Arg Asn Val Thr Val Ala Glu Val Thr
      130          135          140
Tyr Cys Asn Ser Ile Ser Val Ala Glu His Val Val Met Met Ile Leu
145          150          155          160
Ser Leu Val Arg Asn Tyr Leu Pro Ser His Glu Trp Ala Arg Lys Gly
      165          170          175
Gly Trp Asn Ile Ala Asp Cys Val Ser His Ala Tyr Asp Leu Glu Ala
      180          185          190
Met His Val Gly Thr Val Ala Ala Gly Arg Ile Gly Leu Ala Val Leu
      195          200          205
Arg Arg Leu Ala Pro Phe Asp Val His Leu His Tyr Thr Asp Arg His
      210          215          220
Arg Leu Pro Glu Ser Val Glu Lys Glu Leu Asn Leu Thr Trp His Ala
225          230          235          240
Thr Arg Glu Asp Met Tyr Pro Val Cys Asp Val Val Thr Leu Asn Cys
      245          250          255
Pro Leu His Pro Glu Thr Glu His Met Ile Asn Asp Glu Thr Leu Lys
      260          265          270
Leu Phe Lys Arg Gly Ala Tyr Ile Val Asn Thr Ala Arg Gly Lys Leu
      275          280          285
Cys Asp Arg Asp Ala Val Ala Arg Ala Leu Glu Ser Gly Arg Leu Ala
      290          295          300
Gly Tyr Ala Gly Asp Val Trp Phe Pro Gln Pro Ala Pro Lys Asp His
305          310          315          320
Pro Trp Arg Thr Met Pro Tyr Asn Gly Met Thr Pro His Ile Ser Gly
      325          330          335
Thr Thr Leu Thr Ala Gln Ala Arg Tyr Ala Ala Gly Thr Arg Glu Ile
      340          345          350
Leu Glu Cys Phe Phe Glu Gly Arg Pro Ile Arg Asp Glu Tyr Leu Ile
      355          360          365
Val Gln Gly Gly Ala Leu Ala Gly Thr Gly Ala His Ser Tyr Ser Lys
      370          375          380
Gly Asn Ala Thr Gly Gly Ser Glu Glu Ala Ala Lys Phe Lys Lys Ala
385          390          395          400
Val

```

<210> 3

<211> 42

<212> DNA

<213> Artificial Sequence

<220>

<223> Artificially synthesized primer sequence

<400> 3

ctttctagag gaattcaacc atggcaaaag ttctgtgtgt tc

42

<210> 4

<211> 34

<212> DNA

<213> Artificial Sequence

<220>

<223> Artificially synthesized primer sequence

<400> 4

cagtctagat tagaccgctt ttttgaattt ggcg

34

<210> 5

<211> 42

<212> DNA

<213> Artificial Sequence

<220>

<223> Artificially synthesized primer sequence

<400> 5

taatctagag gaattcaata atggatccaa caatgacgtt tc

42

<210> 6

<211> 35

<212> DNA

<213> Artificial Sequence

<220>

<223> Artificially synthesized primer sequence

<400> 6

tagaagctta agctattaata cgcaagtgtta cccac

35

<210> 7

<211> 42

<212> DNA

<213> Artificial Sequence

<220>

<223> Artificially synthesized primer sequence

<400> 7

ctttctagag gaattcaacc atggcaaaag ttctgtctgt tc

42

<210> 8

<211> 49

<212> DNA

<213> Artificial Sequence

<220>
 <223> Artificially synthesized primer sequence

 <400> 8
 gtatccggtt tgcgacgtcg tgacgctgaa ctccccgtg caccgccaa 49

 <210> 9
 <211> 49
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Artificially synthesized primer sequence

 <400> 9
 ttcggggtgc agcggggagt tcagcgtcac gacgtcgaa accggatac 49

 <210> 10
 <211> 33
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Artificially synthesized primer sequence

 <400> 10
 cggaagtcac ctactcaaac tcgacgagc tcg 33

 <210> 11
 <211> 33
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Artificially synthesized primer sequence

 <400> 11
 cgacgctgat cgagtttgag taggtgactt ccg 33

 <210> 12
 <211> 33
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Artificially synthesized primer sequence

 <400> 12
 gacatgtatc cggtttctga cgtcgtgacg ctg 33

 <210> 13
 <211> 33
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Artificially synthesized primer sequence

<400> 13
 cagcggtcacg acgtcagaaa ccggatacat gtc 33

<210> 14
 <211> 35
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Artificially synthesized primer sequence

<400> 14
 cgagatcctg gagtcattct tcgaaggccg tccga 35

<210> 15
 <211> 35
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Artificially synthesized primer sequence

<400> 15
 tcggacggcc ttcgaagaat gactccagga tctcg 35

<210> 16
 <211> 30
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Artificially synthesized primer sequence

<400> 16
 atggcaaaag ttttagctgt tctttacgat 30

<210> 17
 <211> 30
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Artificially synthesized primer sequence

<400> 17
 atcgtaaaga acagctaaaa cttttgcat 30

<210> 18
 <211> 21
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Artificially synthesized primer sequence

<400> 18

ggcaaatatt ctgaaatgag c 21

<210> 19
 <211> 20
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Artificially synthesized primer sequence

<400> 19
 tcacgacgtc gcaaaccgga 20

<210> 20
 <211> 30
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Artificially synthesized primer sequence

<400> 20
 atggcaaaag ttttagtagt tctttacgat 30

<210> 21
 <211> 30
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Artificially synthesized primer sequence

<400> 21
 atcgtaaaga actactaaaa cttttgccat 30

<210> 22
 <211> 27
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Artificially synthesized primer sequence

<400> 22
 gtgacgctga acgctccgct gcacccc 27

<210> 23
 <211> 27
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Artificially synthesized primer sequence

<400> 23
 ggggtgcagc ggagcggttca gcgtcac 27

<210> 24
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Artificially synthesized primer sequence

<400> 24
gtgacgctga acgttccgct gcacccc 27

<210> 25
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Artificially synthesized primer sequence

<400> 25
ggggtgcagc ggaacgttca gcgtcac 27

<210> 26
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Artificially synthesized primer sequence

<400> 26
gaagtcacct acgctaactc gatcagc 27

<210> 27
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Artificially synthesized primer sequence

<400> 27
gctgatcgag ttagcgtagg tgacttc 27